



## Pathology/Biology Section - 2015

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### H53 **Skeletal Trauma Analysis in the Elderly: A Case Study on the Importance of a Contextual Approach**

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After attending this presentation, attendees will understand the advantages of using a contextual approach, as well as the value of forensic anthropological assessments, when interpreting patterns of trauma in potential elder abuse cases.

This presentation will impact the forensic science community by demonstrating the importance of considering age, medical history, and scene findings in interpreting the presence, timing, and cause of trauma by using a case study as an example. This presentation highlights the unique nature of the aging skeleton during forensic analyses. The elder skeleton presents different patterns of peri-mortem and postmortem trauma compared to younger adults, making interpretations of elder abuse difficult. In addition, this presentation will also underscore the importance of viewing all of the skeletal elements present, not just those in question.

With increasing age, the adult skeleton becomes weak and prone to fractures, especially in adults with osteoporosis, making injury interpretation difficult. Multiple studies have investigated common injury sites and mechanisms in elderly individuals; however, research concerning the timing of injury is lacking. Being able to distinguish accidental skeletal trauma from abuse-inflicted trauma, as well as postmortem damage, is significant in investigating possible cases of elder abuse and will impact criminal prosecutions.

In 2010, the mummified remains of a 93-year-old woman were found within her home in a sitting position on the couch, slumped over to her left side. She was completely clothed in winter clothing and covered by blankets, consistent with the season during which she died. The decedent's son failed to notify authorities of his mother's death and continued to cash her Social Security checks in the months following. Local authorities requested an autopsy due to the suspicious nature of the death and monetary gain by the son. During autopsy, peri-mortem fractures of the right ribs were observed by the medical examiner and a request was made for a forensic anthropological trauma analysis of the ribs. Initially, the medical examiner was only going to submit the ribs in question for trauma analysis. This could have resulted in an incorrect determination of the cause/manner of death. An incorrect conclusion of inflicted trauma could have resulted in inappropriate criminal charges.

Osteological examination revealed multiple bilateral antemortem rib fractures in different stages of healing as well as peri-mortem fractures. The decedent also displayed significant kyphosis and compression fractures throughout the vertebrae and advanced osteoporosis, as determined through radiographs of the proximal femur. In addition, she also had a left femoral head replacement consistent with common treatment for hip fractures in elderly individuals suffering from osteoporosis. A review of the decedent's medical history confirmed the diagnosis of osteoporosis and also revealed she had Chronic Obstructive Pulmonary Disease (COPD). COPD causes excessive coughing and, in someone with advanced osteoporosis, has been found to produce rib fractures.

Of particular concern in this case are the rib fractures. In juveniles, rib fractures in different stages of healing are consistent with abuse; however, with the decreased strength of bones in the elderly, their susceptibility to accidental injury, and decreased bone healing making existing fractures prone to re-fracture, the incidence of rib fractures in various stages of healing may not indicate abuse.

Along with the individual's medical history, examination of the scene photos was critical in making a final determination that the peri-mortem fractures observed on the left ribs were not due to inflicted trauma, but the result of the body weight exerting tension on the already fragile ribs. By taking into account aging factors, the scene, and existing medical conditions, the skeletal injuries were found not to be consistent with abuse.

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#### **Elder Abuse, Rib Fractures, Scene Evidence**